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A Survey of Sport Fishing in the Illinois Portion of Lake Michigan

March through September 2014

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Charles R. Roswell and Sergiusz J. Czesny

University of Illinois
Prairie Research Institute
Illinois Natural History Survey

Submitted to
Division of Fisheries, Illinois Department of Natural Resources
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Table 1. Common and scientific names of fishes appearing in this report of the survey of sport fishing in the Illinois portion of Lake Michigan. Only common names will be used in the following text.

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Bluegill sunfish	*Lepomis macrochirus*
Brown trout	*Salmo trutta*
Channel catfish	*Ictalurus punctatus*
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*Oncorhynchus kisutch*
Common carp	*Cyprinus carpio*
Freshwater drum	*Aplodinotus grunniens*
Lake trout	*Salvelinus namaycush*
Largemouth bass	*Micropterus salmoides*
Rainbow smelt	*Osmerus mordax*
Rainbow trout	*Oncorhynchus mykiss*
Rock bass	*Ambloplites rupestris*
Round goby	*Neogobius melanostomus*
Sea lamprey	*Petromyzon marinus*
Smallmouth bass	*Micropterus dolomieu*
Yellow perch	*Perca flavescens*

EXECUTIVE SUMMARY

The purpose of this study was to estimate sport fishing effort, harvest, and expenditures by anglers fishing the Illinois portion of Lake Michigan (excluding charter fishing). Information provided by this study is important for management of sport fisheries in the Illinois waters of Lake Michigan. Data were collected via a contact creel survey on randomly-selected days over a six month period (4/1 - 9/30), and were summarized and extrapolated over the six month period to obtain estimates for specific locations as well as for the entire Illinois portion of Lake Michigan. Sampling dates were randomly chosen for access sites within two strata: time period (segment = three week blocks) and type of day (weekday vs. weekend/holiday). An additional March survey was conducted at selected sites along the Lake Michigan shoreline. The March survey was stratified by weekend/ weekday, but the entire month of March was treated as one segment. All data have been summarized by month for this report.

Conclusions:

1. Total angler effort in 2014 declined 5.1% from the 2013 survey period. Effort increased 4.4% for pedestrian anglers and decreased 12.9% for boat anglers.

2. The yellow perch harvest increased 2.6% from 2013 estimates to 54,475 fish. Mean length increased 6.2% to 26.9 cm (10.6 in), while mean weight increased 29.7% to 267 g (0.59 lb.).

3. Coho salmon comprised most of the salmonid harvest (57.7%) despite a 16.3% decrease in harvest compared to 2013. The estimated 2014 coho salmon harvest was 30,314 fish. The mean size of coho salmon measured by creel clerks in 2014 was 1,147 g (2.53 lb.), and 48.5 cm (19.1 in) long, representing decreases of 31.7% in weight and 11.9% in length from 2013.

4. Chinook salmon harvest was estimated at 5,012 fish, a 22.0% drop from 2013. The mean size of Chinook in 2014 was 4,256 g (9.38 lb., a decrease of 6.2%) and 72.7 cm (28.6 in) long (an increase of 2.9% from 2013).

5. Compared to 2013, rainbow trout harvest increased 116.6% to 6,832 fish. Mean rainbow trout weight decreased 9.1% to 2709 g (5.97 lb.), while length decreased 4.4% to 62.1 cm (24.5 in).

6. The lake trout harvest increased to an estimated 4,293 fish, a 44.9% increase from 2013. The mean length of lake trout harvested increased compared to 2013 by 1.2% to 66.5 cm (26.2 in), and mean weight decreased 5.9% to 2,847 g (6.28 lb.).

7. The estimated brown trout harvest increased 21.4% from 2013 to 6,086 fish. Mean length of harvested brown trout increased by 5.1% to 56.2 cm (22.1 in), and mean weight increased by 27.5% to 2,668 g (5.88 lb.).

8. Estimates of total expenditures for boats, motors, trailers and fishing gear in 2014 were $7.26 million, 392.5% higher than in 2013.

9. In March, 2014, angler effort and harvest of brown trout, rainbow trout, and coho salmon all increased compared to 2013. Total effort was 6,408 angler hours, rising 66.5% from 2013. March harvest in 2014 decreased 100% for yellow perch (0 fish compared to 1,135 fish in March, 2013), and increased 9.0% for brown trout (73 fish) and 2,813% for coho salmon (1,369 fish). Rainbow trout harvest was 15 fish, compared to 0 fish in March of 2013. As in March of 2013, no lake trout or Chinook salmon harvest was documented in March of 2014.

ABSTRACT

A contact creel survey was conducted from April 1 to September 30, 2014, covering all legal sport fishing during that period (both by pedestrians and anglers fishing from boats), excluding fishing from chartered boats and smelt fishing. The intent of the survey was to provide reliable estimates of sport fishing activity, sport fish harvest, expenditures for sport fishing, and the quality and distribution of sport fishing for the Illinois portion of Lake Michigan. Total fishing effort for pedestrians and boaters for the survey period was estimated at 363,053 angler-hours. Total harvest estimates for major species during the survey period include 54,475 yellow perch, 6,086 brown trout, 6,832 rainbow trout, 4,293 lake trout, 30,314 coho salmon, and 5,012 Chinook salmon. Angler expenditures for boats, motors, trailers and fishing gear were estimated at $7.26 million. Anglers traveled an estimated 2.00 million miles (round trip). The yield value of fish harvested by sport fishing was approximately $1.60 million.

An additional early-season survey was conducted during March 1 to March 31 at Waukegan Harbor, Montrose Harbor and Calumet Park for pedestrian anglers and Waukegan Harbor and Calumet Park for launched-boat anglers. In total, anglers harvested an estimated 73 brown trout, 15 rainbow trout, and 1,369 coho salmon in an estimated total of 6,408 hours of fishing during March. Total expenditures for boats, motors, trailers and fishing gear during March were estimated at $300,340.

INTRODUCTION

This report summarizes results of a survey of sport fishing in the Illinois portion of Lake Michigan from April 1 to September 30, 2014. All types of legal sport fishing during that period, with the exceptions of charter-boat fishing and smelt fishing, were covered by the survey. A supplemental survey of the early spring fishery from March 1 to March 31 was also conducted. The intent of the project was to provide estimates of sport fishing effort, harvest, and quality, as well as estimated fishing-related expenditures for anglers fishing Illinois waters of Lake Michigan. Biological data concerning length, weight, sea lamprey wounding and scarring, and marks (fin clips and external tags) were also collected from angler-harvested fish. Creel surveys for the Illinois portion of Lake Michigan have been conducted annually by the Illinois Natural History Survey since 1985; results from the first twenty-nine years of these surveys have been reported in annual technical reports, most recently for the 2013 survey (Roswell and Czesny 2014). Prior to these annual surveys, the most recent creel survey of this type in Illinois was conducted in 1979 by the Illinois Department of Conservation (Muench 1981).

Geographic setting

This survey occurred at access locations along the 63-mile Illinois shoreline of Lake Michigan (Figure 1), a highly-developed stretch of shoreline. Chicago covers roughly one-third of the Illinois shore, and a series of smaller cities cover most of the remainder. No significant tributary streams enter Lake Michigan in Illinois waters. The slope of the near-shore lake bottom is steeper in the northern part of Illinois waters than near Chicago, which forces boaters

from Chicago to go considerably farther from shore to reach good salmon waters (deep and cold) during the summer than boaters departing from North Point Marina. Another geographic feature is the easy access to other states' waters for boaters (e.g., Wisconsin waters for boaters launching at North Point Marina and Indiana waters for anglers launching at Calumet Park). For this survey, data were assumed to represent anglers fishing in Illinois waters.

Figure 1. The Illinois shoreline of Lake Michigan.

METHODS

Non-charter angling activity was categorized into two groups that were evaluated separately: (1) Pedestrian and launched-boat anglers, for which data were generated via personal interviews and direct head counts, and (2) anglers using moored boats. The moored boat estimates presented here are based on extrapolating estimates for anglers using launched boats using data quantifying the distribution of moored-boat angling relative to launched-boat angling.

Pedestrians and launched-boat anglers

Effort and harvest were estimated for pedestrian and launched-boat anglers using selected primary fishing areas (i.e., selected shore access locations and boat ramps), and those estimates were extrapolated to other areas. For each primary fishing area, a modified stratified random sampling design similar to that suggested by Malvestuto (1996) was used. The primary sampling unit of the survey was the fishing day. Daily estimates (e.g., total harvest by species, expenditures by category, etc.) for each primary site were combined to estimate seasonal totals using the formula for stratified random samples given by Cochran (1977).

Use of primary fishing areas

The primary fishing areas for pedestrian anglers were North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), and four locations in Chicago: Montrose Harbor, Belmont Harbor, Jackson Park, and Calumet Park. The primary fishing areas for launched boats were boat ramps at North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), Diversey Harbor (Chicago), and Calumet Park (Chicago). For each day scheduled to be surveyed, a creel clerk was assigned to visit three areas, two pedestrian areas and one launch area, in a prescribed order. The three areas were always one of three groups: (1) Waukegan Harbor (pedestrians), North Point Marina (pedestrians), North Point Marina (launched boats); (2) Montrose Harbor (pedestrians), Belmont Harbor (pedestrians), Diversey Harbor (launched boats); and (3) Jackson Park (pedestrians), Calumet Park (pedestrians), Calumet Park (launched boats). Additional visits to the launch ramps at Waukegan Harbor were added to the design in 2006 and were surveyed in the same manner as the launch ramp sites in the three groups.

Estimates obtained for the primary fishing areas were extrapolated to all other areas of the Illinois shoreline based on the distribution of pedestrian anglers and boat trailers. Data describing these distributions were obtained via an annual series of aerial counts during helicopter flights (conducted on weekends during the spring and summer during 2004-2013; the helicopter usually used for flights was not available during 2014). During each flight, pedestrian anglers were counted and recorded on a form divided by site and the type of pedestrian site: structure (piers and breakwalls), shore (shoreline) and harbor (inside enclosed harbors). Pedestrian anglers who were not at a recognized site were counted and listed in the vicinity of the closest recognized site; the sum of these became the total for "other areas" on the form. Boat trailers with a vehicle attached were counted in the parking lots of launch ramps and were listed on the form at the appropriate site. All of the data collected were combined for the period to

calculate an average percentage of total fishing effort occurring at each location (Table 2). Distribution data for the last 10 years were included to increase confidence in extrapolating estimates from primary fishing areas.

Distribution of fishing

Pedestrians and launched boats

The aerial survey documented angler use of 24 fishing areas (in addition to "other" areas; Table 2). During 2004 – 2013, these 24 areas accounted for 96.8% of the pedestrian anglers observed in the aerial surveys and 100% of the boat trailers parked near launch areas. Boats launched from the Calumet Yacht Club were not included in this survey (located in Illinois, but boats must leave the marina via Indiana waters). Interviews for the creel survey were conducted at six pedestrian fishing areas that accounted for 79.3% of the pedestrian anglers observed during the helicopter flights and four launch areas that accounted for 80.7% of the boat trailers observed near launch areas.

Table 2. Distribution of pedestrian anglers and boat trailers along the Illinois shoreline of Lake Michigan, determined by helicopter flights during 2004-2013.

Area	Pedestrian anglers (%)	Boat trailers (%)
1. IL Beach State Park & North Point Marina	1.3	35.5
2. Waukegan Harbor and breakwalls	8.4	30.1
3. Great Lakes Naval Training Station	0.2	0.3
4. Forest Park	0.0	1.4
5. Central Park	0.1	1.6
6. Winnetka (Lloyd and Tower Parks)	0.3	4.1
7. Wilmette Harbor	1.2	NA
8. Northwestern Univ. and Dawes Park	0.3	5.1
9. Farwell Avenue pier	1.1	NA
10. Hollywood Avenue pier	0.7	NA
11. Foster Avenue pier	0.6	NA
12. Montrose Harbor and breakwalls	57.8	NA
13. Belmont Harbor	5.8	NA
14. Diversey Harbor and breakwalls	1.6	7.3
15. North Avenue pier	0.0	NA
16. Navy Pier	0.4	NA
17. Monroe Street breakwalls	0.8	NA
18. Burnham Harbor and vicinity	8.1	5.9
19. McCormick Place seawall	1.0	NA
20. 31st Street	0.4	0.3
21. 50th Street access area	0.2	NA
22. 59th Street Harbor	0.6	NA
23. Jackson Park Harbor and breakwall	5.3	0.7
24. Calumet Park	0.8	7.8
25. other areas	3.2	0.0

Moored boats

In the Illinois portion of Lake Michigan, boats are moored at several locations: North Point Marina, Waukegan Harbor, Great Lakes Naval Training Station, Wilmette Harbor, and the Chicago Park District harbors. The number

of power boats kept at moorings was used as an index of fishing activity from moored non-charter power boats (Table 3). Some fishing may occur from sail boats, but we assumed that it was a negligible portion of all fishing. Two private lift services (referred to as I/O service in Table 3) were included in the survey: Larsen Marine at Waukegan Harbor and Skipper Bud's at North Point Marina. Boats kept at moorings or on land (lift service) in the Calumet or Chicago River systems were assumed to represent a negligible portion of fishing activity and were not included.

Table 3. Mooring locations along the Illinois shoreline of Lake Michigan and numbers of non-charter power boats moored at each location, as determined by the marinas and port authorities. Total number of power boats per port in bold.

Mooring area	Number of power boats
North Point Marina	**472**
Public Moorings	407
Skipper Bud's I/O service	65
Waukegan Harbor	**294**
Public Moorings	219
Larsen Marine I/O service	75
Great Lakes Naval Training Station	**71**
Wilmette Harbor	**111**
Chicago Park District	**2,751**
Diversey	680
other harbor moorings	2071

Early spring survey

Only two groups of sites were surveyed in the month of March. A group in Lake County consisted of Waukegan Harbor (pedestrians) and Waukegan Harbor (launched boats). A Chicago group consisted of Montrose Harbor (pedestrians), Calumet Park (pedestrians), and Calumet Park (launched boats). Virtually all the open boat ramps and the areas of heaviest concentrations of open water pedestrian anglers this early in the season were included in these groups (based on personal observations and previous surveys). Effort, harvest, and expenditures by moored-boat anglers were not estimated in the March survey because very few boats are at moorings at that time.

Selection of dates in a stratified random sample

The creel survey season (1 April through 30 September 2014, representing the major portion of fishing activity) was stratified by segment (three-week time periods) and type of day (weekends and holidays, or weekdays). The following 18 strata were formed:

1. Week days 4/1 - 4/20 2. Weekend days 4/1 - 4/20

3. Week days 4/21 - 5/11	4. Weekend days 4/21 - 5/11
5. Week days 5/12 – 6/1	6. Weekend days 5/12 – 6/1
7. Week days 6/2- 6/22	8. Weekend days 6/2- 6/22
9. Week days 6/23 - 7/13	10. Weekend days 6/23 - 7/13
11. Week days 7/14 – 8/8	12. Weekend days 7/14 – 8/8
13. Week days 8/4 - 8/24	14. Weekend days 8/4 - 8/24
15. Week days 8/25 - 9/14	16. Weekend days 8/25 - 9/14
17. Week days 9/15 - 9/30	18. Weekend days 9/15 - 9/30

For each of the three groups of sites, four survey dates were selected at random within each stratum, with the restriction that all three groups were sampled at least one week day (Monday through Friday) and one weekend day each week. For strata 17 and 18, which were several days shorter than the others, fewer than four dates were selected for each group of sites. All three sites in each group were visited on the dates selected for that group. In addition to the surveys conducted at the three groups of sites, the launch ramps at Waukegan Harbor were surveyed three times per stratum, except during strata 17 and 18, when only 2 visits were made in each stratum.

The early spring survey was treated in a similar fashion to the core survey except that the segment duration was the entire month of March.

1. Week days 3/1 - 3/31	2. Weekend days 3/1 - 3/31

Data collection

Data were collected via two methods at each site: interviews during a two-hour period, and counts at the beginning and end of the two-hour period. Additionally, at boat launch sites, the arrival times of returning boats were recorded for all boats (whether interviews were conducted or not). Each interview was designed for one angling party i.e., one or more anglers fishing together) to increase the number of angling parties that could be interviewed and to minimize redundant questions within angling parties. At the eight pedestrian sites, the two-hour interview period was either 0600 to 0800 or 0830 to 1030. At the boat launch sites, the two-hour period was always 1100 to 1300. For pedestrian sites, individual anglers were counted at the beginning and end of each two-hour period. For boat launch sites, trailers (with vehicles attached, excluding personal watercraft trailers) were counted.

Creel clerks (who conducted the interviews) gathered information related to effort (number of angler-hours, number of angler-trips), expenditures for the present fishing trip (by category: major = boat, motor, or trailer; minor = fishing gear), distance driven to fishing locations (in miles, round-trip), harvest (by species), and species sought by angling parties. The species sought by anglers were grouped into four categories: Salmonids (including salmon and trout), yellow perch, other species (any species or group of species – e.g., “bass” – except salmonids and yellow perch), and unspecified (when the angling party was not targeting a specific species or group, i.e., “anything that bites”). Clerks also weighed and measured fish in possession of the anglers, noted whether each fish had sea

lamprey wounds and scars, and noted any tags or marks (including clipped fins). The instructions to, and data form used by, creel clerks are in Brofka and Czesny (2008).

Variables measured for each date

Data collected during interviews were used to estimate the following variables for each date at each site: (1) Harvest per angler-hour, determined for each species by dividing the number of fish harvested by all parties interviewed by the number of hours of fishing by individuals in those parties; (2) Expenditures per angler-trip, categorized into major and minor categories. For all expenditures, total expenditures by all anglers interviewed were divided by the number of anglers interviewed; (3) Distance traveled (by automobile) per angler-trip. As for expenditures, the total, round-trip miles traveled by all anglers interviewed were divided by the number of anglers interviewed; (4) Angler-hours (i.e., total time spent fishing by all anglers; see following paragraph); (5) angler-trips (i.e., total number of anglers who fished; see following paragraph); (6) Total harvest was calculated for each species as harvest per angler-hour multiplied by angler-hours; and (7) total expenditures were determined for each category as expenditures per angler-trip multiplied by angler-trips.

Angler-hours and angler-trips were determined differently for pedestrians and boaters. For pedestrians, angler-hours was calculated by multiplying the average number of anglers (from counts at the beginning and end of each two-hour period) by the number of hours in the day (from 0.75 hour before sunrise to 0.75 hour after sunset), and angler-trips was calculated as angler-hours divided by the average duration of a pedestrian fishing trip (mean of 4.00 hours for all pedestrian interviews in 2014). The number of angler-trips for anglers using launched boats was estimated by multiplying the number of anglers returning on boats during the two-hour interview period by the ratio of the number of all boats returning in a day to the number returning between 1100 and 1300. By monitoring all boat traffic at North Point Marina on 6 days in 2014, the number of boats returning all day was estimated to be 2.864 times the number returning during 1100 to 1300 interview period. Launched-boat angler-hours were estimated by multiplying the number of angler-trips by the monthly mean trip duration. To smooth unrealistic differences between months, estimates of angler-trips were multiplied by the ratio of the annual mean to monthly mean of estimated anglers per trip. Estimates of angler-hours were multiplied by both this ratio and the ratio of annual mean to monthly mean of hours per trip. In 2014, the annual mean number of anglers per boat was 2.41, and the annual mean trip duration for boat anglers was 5.62 hours.

Expansion of daily estimates

The formula given by Cochran (1977) for stratified random samples was used to expand daily estimates to seasonal site-specific estimates of effort, harvest, and expenditures. A different set of strata were used for expansion of estimates: we used month-long segments (e.g., April, May, June), each divided into weekend days and week days (instead of the three-week segments described above) and obtained monthly totals for each type of estimate.

Extrapolation to other areas

Extrapolations of seasonal estimates from primary fishing areas to other areas were based on the distributions of pedestrian anglers and boat trailers (assumed to reflect the distribution of launched-boat anglers; Table 2). Harvest, effort, and expenditures at areas not visited were estimated by extension of estimates for the nearest primary fishing areas. Thus, for pedestrian anglers, estimates for Waukegan Harbor were extended to all other areas north of and including Wilmette Harbor (except North Point Marina); estimates for Montrose Harbor were extended to all remaining areas north of Belmont Harbor; estimates for Belmont Harbor were extended to all remaining areas north of the Monroe Street breakwalls; estimates for Jackson Park were extended to all areas south of Monroe Street except for Calumet Park. For launched boats, estimates for Waukegan Harbor were extended to all launch ramps north of Wilmette (including the "other" areas listed in Table 2, but excluding North Point Marina); estimates for Diversey were extended to Dawes Park; and results for Calumet Park were extended to the ramps at Jackson Park, 31st Street Harbor, and Burnham Harbor.

Moored boats

Effort, harvest, and expenditure estimates for anglers using moored boats were extrapolated from calculations for launched boats. First, the ratios of moored fishing boats to launched fishing boats for North Point Marina and Diversey Harbor were estimated: On three dates during the spring and summer of 2014 the numbers of fishing boats returning to moorings were counted while, simultaneously, the numbers of fishing boats returning to the launch ramp were also counted. Charter boats were excluded from these counts. Due to low numbers of returning boats, the ratios of moored to launched boats were estimated using data from 2008-2014. These ratios were 0.816 in North Point Marina and 1.29 in Diversey Harbor.

Using these figures, seasonal estimates of effort, harvest, and expenditures by anglers using launched boats at North Point, Waukegan (ratio assumed to be equal to North Point Marina), and Diversey harbors were extrapolated to moored boats. Thus, for example, the moored boat effort at North Point Marina for a given segment was estimated to be the launched boat effort for that segment multiplied by 0.816. Based on the distribution of moored power boats, estimates for Waukegan Harbor were extrapolated to boats moored in Wilmette Harbor and Great Lakes Naval Training Station, and the estimates for Diversey Harbor were extrapolated to all other boats moored in Chicago.

Changes in creel survey methods

Creel survey methods have varied during the past twenty-nine years of the creel survey, so comparisons should be made with caution. The influences of changes in methods will continue to be evaluated.

Confidence intervals and bias

Estimates of harvest, effort, and expenditures are presented without confidence intervals, as we have not fully evaluated bias in our estimates. Although we have collected and will continue to collect data with which to partially assess biases, assessing potential impacts on precision of estimates is not possible at this time.

Yield values

The term "yield value" is used in this report to describe the hypothetical market price of fish harvested by anglers (if sold as fillets). To estimate the yield value, the estimated harvest for each species was multiplied by the estimated mean weight of that species to produce an estimated round weight. That round weight was then multiplied by 0.4 (assuming 60% loss in filleting process in keeping with previous years' estimates; e.g., Brofka et al. 2014) to produce the harvested marketable weight for each species. The marketable weight for each species was then multiplied by species-specific prices (approximated using prices observed on the internet by C.R. Roswell, February 2015) to produce the market value of the 2014 harvest for each species.

Missing data

On some dates creel clerks were unable to complete their assigned interviews due to factors such as illness and vehicle break-downs. When data were missing from some of the assigned dates in a stratum, estimates for the stratum were based only on data from the surveyed dates. Thus, the sample size was smaller in these cases than for strata in which all interview sets were completed, and the resulting estimates were not as precise as estimates derived from full data sets. In 2014, all or some of the scheduled surveys were incomplete on fewer than 4% of all scheduled survey days.

Alternate sites/altered sites

Unforeseen circumstances (e.g., construction) have caused one or more primary sites to be closed or less accessible during part or all of many past sampling seasons. In 2014, there were a few minor disruptions. Ice remained in Waukegan harbor and North Point Marina into the first week of April, delaying placement of docks at ramps, and limiting boat access. The fishing pier at North Point Marina was not deployed until around May 1st, limiting pedestrian access. There was a fence across the pier at Jackson during much of April and May. The far southwest side of Montrose harbor and the "Green Jetty" (pier at the west side of the mouth of Montrose Harbor) areas were closed during late spring and all summer due to construction, though angler effort in this area is typically low relative to other parts of the Montrose site.

RESULTS

Overview

Estimates reported here are rounded; this may result in values for "totals" that differ slightly from the sum of individual values. For simplicity, the words "approximately" or "estimated" are not repeated with each estimated

value. Detailed results for 2014 are presented in Tables 4 - 10. Tables 4 and 5 list seasonal harvest and effort (angler hours) estimates for anglers. Tables 6 and 7 present effort and harvest for each segment. Table 8 provides yield values. Table 9 lists fin clip abbreviations; fin clips observed by our creel clerks are listed in Table 10, with the number of occurrences of each clip or clip combination listed by species. Table 10 can assist in determining the contributions of different stockings of fish to the sport fishery in the Illinois portion of Lake Michigan. Tables 11 and 12 report angler trips and expenditures among angler types and among years. Tables 13 and 14 compare angler hours and harvest by fish species between angler types and for each year. Table 15 compares minor fish species harvest for each year.

Total April-September non-charter sport fishing effort in the Illinois portion of Lake Michigan was 363,053 angler-hours. Harvest for major species included 54,475 yellow perch, 30,314 coho salmon, 5,012 Chinook salmon, 6,832 rainbow trout, 4,293 lake trout and 6,086 brown trout (Table 4). Anglers spent $7.26 million during the study period for boats, motors, trailers, and fishing gear used on Lake Michigan fishing trips (Table 11). Anglers fishing Lake Michigan drove 2.00 million miles (round trip; Table 11). The Illinois sport fishing harvest was estimated to have a yield value of $1.60 million (Table 8).

Pedestrian fishing

From April 1 - September 30, 2014, pedestrian anglers spent 180,471 hours fishing in 45,078 trips to Lake Michigan (Table 4, Table 11). Yellow perch comprised the largest portion of the pedestrian harvest (51,731 fish; Table 4). Coho salmon were the most important salmonid species for pedestrian anglers, with a harvest of 6,017 (Table 4). Pedestrian anglers spent $374,365 (mean = $8.30 per trip) for fishing gear and drove 888,160 miles (mean = 19.7 miles per round trip – to and from the lake shore; Table 11).

Boater fishing

Anglers using launched or moored boats made 32,471 trips to Lake Michigan (Table 11) and spent 182,582 hours fishing (Table 4). The most abundant components of boater harvest were coho salmon (24,296), rainbow trout (6,277), and brown trout (5,237; Table 4). North Point Marina accounted for 38.3% of the salmonines (lake trout, brown trout, rainbow trout, Chinook salmon, and coho salmon) taken by all anglers who used boats, more than any other port (Table 4). See Appendix A for a comparison of the charter-boat fishery with non-charter boat angling. Anglers launching at Calumet Park accounted for 48.6% of the yellow perch harvested by boat anglers (Table 4). Total, fishing-related expenditures by anglers using boats were $6,890,227 ($212.20 per trip), with 88.9% of that amount spent on boats, motors, and trailers (Table 11). Boaters drove 1,107,217 round-trip miles (34.1 miles per trip; Table 11).

Yield values

The estimated yield values of the three most valuable (in total yield) sport species were $504,574 for coho salmon, $488,186 for Chinook salmon, and $206,094 for yellow perch (Table 8). Aside from yellow perch harvested from

the Wisconsin portion of Green Bay, none of the species listed in Table 8 are currently commercially available from Lake Michigan. Therefore, the values of all species are estimated from the retail prices for fish that are farm-raised or commercially-harvested in other waters. An estimated price for brown trout fillets was not available, so the price for lake trout fillets was used to estimate the yield value of brown trout.

Comparisons with preceding years

Compared to 2013, total angler fishing effort decreased by 5.1% in 2014 (Table 13). Boater effort decreased 12.9%, while pedestrian effort increased 4.4% (Table 13). Angler harvest rates for salmonids (number of fish per angler hour) decreased compared to 2013 for boat anglers, but increased for pedestrian anglers (Figure 2a). Boat and pedestrian angler harvest rates for yellow perch decreased compared to 2013 (Figure 2b). Total effort directed at salmonids was 238,307 angler-hours, with about 68% occurring from boats, similar to most years in the last decade (Table 4, Figure 3a). Total effort directed at yellow perch was 90,598 angler-hours, with boat anglers accounting for approximately 13%; both total perch-directed effort and the proportion of angler-hours comprised by boaters were much higher during 2006-2010 (Table 4, Figure 3b).

The yellow perch harvest of 54,475 was an increase of 2.6% from the 2013 harvest (Table 13 and Figure 4). The average weight of yellow perch kept by anglers increased to 267 g (0.59 lb.; Table 8), and average length increased slightly to 269 mm (Figure 5). As in 2013, yellow perch fishing for boat anglers was essentially nonexistent near Waukegan in 2014 (no boater harvest documented by this survey; Table 7), despite high harvest there less than a decade ago. Most of the boat harvest of yellow perch occurred during June and July, especially near Calumet Park and other southern waters. Pedestrian harvest of yellow perch peaked in June (48.0% of pedestrian harvest), and most of the pedestrian harvest for the entire period occurred at Montrose Park (73.4% of overall pedestrian harvest; Table 6). In 2014, July comprised a much larger portion of total yellow perch harvest than the ten-year mean proportion of harvest occurring in July (Figure 6).

The 2014 harvest of coho salmon decreased by 16.3% compared to 2013 (Table 13 and Figure 7). Weight (1,147 g, or 2.53 lb.) of creeled coho salmon decreased 31.7% and length (485 mm) decreased 11.9% compared to 2013 (Table 8 and Figure 8). The majority (84.7%) of the harvest occurred in May and June (Tables 6 and 7).

The Chinook salmon harvest was 5,012 fish for 2014, a decrease of 22.0% from 2013 (Table 13 and Figure 9). Average length was 727 mm, an increase of 2.9% compared to 2013, but the average weight decreased 6.2% compared to2013, to 4,256 g (9.38 lb.; Table 8 and Figure 10). Most (51.0%) of Chinook salmon harvest occurred in May and June (Tables 6 and 7).

The 2014 harvest of lake trout was 4,293, a 44.9% increase from harvest in 2013 (Table 13). The average weight decreased by 5.9% and average length increased by 1.2% compared to 2013 (Table 8). Lake trout harvest peaked

twice: April accounted for 34.6% of the harvest, while a secondary peak occurred in July and August (33.5% of total harvest; Tables 6 and 7).

The 2014 brown trout harvest (6,086) increased by 21.4% from 2013 (Table 13). The average length (562 mm) increased by 5.1% compared to 2013 and the average weight of 2,668 g (5.88 lb.) increased by 27.5% (Table 8). The majority (71.6%) of the harvest occurred in April (Tables 6 and 7).

The 2014 rainbow trout harvest (6,832) increased drastically from 2013 by 116.6% (Table 13). The average length of 621 mm was a decrease of 4.4% compared to creeled rainbow trout in 2013, and weight (2,709 g, or 5.97 lb.) decreased 9.1% (Table 8). More harvest occurred in April and May than in other months (65.7%; Tables 6 and 7).

Estimated expenditures for boats, motors, and trailers increased by 716.3% compared to 2013 (Table 11). Minor expenditures (i.e., fishing tackle) increased by 57.2% and total mileage decreased by 8.3%.

The 2014 early spring (March) survey saw an increase of 66.5% in angling effort compared to March of 2013. Harvest of salmonine species was higher than for March of 2013: brown trout harvest increased 9.0% and coho salmon harvest increased 2,813%. Rainbow trout harvest was 15 fish (compared to 0 in March of 2013). No yellow perch harvest occurred in March of 2014 (1,135 were harvested in March of 2013). No lake trout or Chinook salmon were harvested in the month of March in either 2013 or 2014 (Table14).

Seasonal patterns in salmonid harvest and effort

The majority of salmon and trout were harvested in April and May (74.4%; Figure 11a, b). The majority of brown trout harvest occurred in April (71.6%), while most rainbow trout and coho salmon were harvested before the end of May (65.7% and 84.7%, respectively. Over half of the lake trout and Chinook salmon harvest occurred by the end of June (58.0% and 51.4%, respectively). Harvest of Chinook salmon was slightly higher in August and September than in July. Salmonid-directed effort by pedestrians was high during April and September, and much lower during May-August. Boater salmonid effort was highest during May and lowest during September, with intermediate levels occurring during April, June, July, and August.

Minor species

In addition to the species for which results are presented in detail in Tables 4 - 14 (commonly-encountered salmonids and yellow perch), creel clerks reported the catch and/ or harvest of several other species by anglers (referred to here as “minor species”; Table 15). For some species, the total number of fish harvested (and total numbers caught) were estimated. For other species, very few fish were observed, so only the actual number observed in anglers’ possession by creel clerks during interviews is reported. Most of these “minor” species were harvested in or near the harbors. Minor species harvested (total caught in parentheses) include: **round goby**, 33,484 (41,576); **freshwater drum**, 688 (981); **rock bass**, 274 (1,492); **common carp**, 104 (786); **smallmouth bass**, 154

(2,314); **alewife**, 30 harvested fish observed; **channel catfish**, 3 fish observed. Additionally, an estimated 1,059 **largemouth bass** and 76 **bluegill** were released (none harvested).

DISCUSSION

Changes in the fishery and the creel survey in 2014

The primary purpose of this report is to report data summaries and other information from a long-term project to fisheries scientists and managers. As such, much of the data collection, analyses, and reporting is very similar to previous years. This is provides a better comparison with previous years' data, enabling a more complete understanding of inter-annual trends in the fishery. However, some minor changes have occurred as a result of changing information needs and changes in the fishery (e.g., access and regulation changes).

Unlike previous years (through 2011), formal estimates of vehicle fuel costs were not included in this report. Prior to 2012, an estimate of $0.10 per mile for fuel was applied to the total miles driven by anglers to and from creel locations. Due to rises in gas prices, this likely would underestimate the actual amount spent by anglers on vehicle fuel. One approach to estimating fuel costs, used by Melstrom and Lupi (2013) as part of a model estimating the value of Great Lakes recreational fishing, uses rates published annually by AAA (AAA 2014). Average gas cost reported by AAA was $0.1300 per mile in 2014 (AAA 2014). Melstrom and Lupi (2013) added $0.05 per mile for vehicles towing trailers to account for increased fuel consumption; employing this approach produces an estimate of $0.1800 per mile for vehicles towing trailers in 2014. Applying the average rate for pedestrian and moored boat anglers' round-trip miles, and the vehicle-with-trailer rate for launched boat anglers' miles, produces estimated fuel costs of $288,612 for all anglers fishing Illinois waters of Lake Michigan during April – September, 2014. This is less than an estimated total of $350,369 in fuel costs for 2013 (using AAA's 2013 rate).

Perhaps the largest change to the fishery in 2014 was the elimination of the closed season for yellow perch fishing in July. Previously (2001 – 2013), fishing for yellow perch was not permitted during the month of July (except for children under 16, with a reduced bag limit, since 2007). In 2014 there was no closed season for yellow perch. This resulted in a large increase in angler effort and yellow perch harvest during July, relative to previous years. In 2014, 42.9% of yellow perch harvest and 38.4% of perch-directed angling effort occurred in July, while July accounted for only 20.0% of yellow perch harvest and 10.0% of perch-directed effort in 2013. Thus, the opening of July to yellow perch angling, by allowing increases in perch-directed effort, prevented a decline in total harvest to below 2013 levels. This is significant because the yellow perch harvest in 2013 was the lowest since 2000.

Angler effort

Total angler fishing effort (indexed by angler-hours) decreased 12.9% for boats and increased 4.4% for pedestrians compared to 2013. Effort has generally been declining since this survey began in 1986. While effort increased

slightly from 2011 to 2012, total effort in both 2013 and 2014 was similar to levels in 2011, suggesting the trend of decreasing angler effort has not reversed.

Yellow perch

Annual yellow perch harvests by anglers in Illinois have varied substantially over time. Estimated angler harvest was well over one million fish each year from 1986 through 1993 (except 1989). However, harvest fell to fewer than 600,000 in 1994, and by 1997 fell to well under 60,000 (driven in part by regulation changes and reduced effort; Brofka and Dettmers, 1999). Harvest increased somewhat in 2001 (to 169,967) in response to increased effort and new regulation changes (repeal of an unprotected slot limit and moving the month closure from June to July). Yellow perch harvest generally increased from 2002 through 2008 to around 300,000, but then declined, and has been under 100,000 fish for the last four years (2011-2014). The mean April-September yellow perch harvest during 2005-2014 was 194,847; however, the mean harvest during 2011-2014 was 64,557, less than one-third of the ten-year mean. Harvest in 2014 increased 19.4% from 2013 for pedestrian anglers and decreased 72.0% for boat anglers (increase of 2.6% combined pedestrian and boat harvest); 2013 was the only year with a lower April-September total yellow perch harvest (53,107) since 2000 (the final year of the slot limit). Overall effort directed at yellow perch increased 22.5%, and overall HPE (harvest per angler effort expressed in fish-per-angler-hour) was 0.60 yellow perch per angler-hour, 16.3% lower than 2013 HPE.

Coho salmon

Coho salmon consistently comprise the largest part of both the boat and pedestrian salmonid fishery. Coho salmon typically make up about 60% of the boater salmonid harvest, and in 2014 accounted for 57.7% of salmonids harvested by the overall non-charter angling fishery. The 2014 harvest of 30,314 coho salmon was 16.3% lower than harvest in 2013. Mean weight of harvested coho salmon during 2014 was 1,147 g, 21.0% heavier than the twenty nine year mean.

Other salmonids

While the coho salmon harvest has traditionally dominated spring and early-summer salmonid harvest, other salmonids (especially Chinook salmon) often make up the large portions of the harvest during mid-summer through early fall. Chinook salmon are popular, as they can attain very large sizes and provide anglers with a good fight. The annual Chinook harvest has fluctuated through time. Bacterial kidney disease (BKD) was blamed for die-offs of Chinook salmon beginning in 1988, resulting in reduced angler harvest of Chinook salmon, (as low as 2,900 fish in 1994). Chinook salmon have since been closely monitored in the hatchery and in the wild for BKD (Clark, 1996). Harvest in 2014 decreased by 22.0% (5,012) compared to 2013, and was below the ten year mean harvest (2005-2014) of around 9,726 fish. Mean weight decreased 6.2% from to 2013 to 4,256 g (9.38 lbs.).

Lake trout harvest peaked in 1998 at 12,000, while the lowest harvest occurred in 2006 (653). Lake trout harvests have generally increased in recent years, following a period of relatively low harvest during 2003-2010. The mean

lake trout harvest for the past ten years is 2,004 fish; the mean harvest for 2011-2014 is 3,475 fish. In 2014 the harvest was 4,293 fish, making 2014 the fourth consecutive year with harvest above the ten–year mean, and the second year in the last three with harvest above the twenty-nine year mean of 3,448 fish.

Brown trout are an important component of the spring salmonid fishery with a ten year mean harvest (2005-2014) of 2,908 fish. The 2014 harvest of 6,086 browns was an increase of 21.4% from the 2013 harvest, and the highest harvest since 1987. The mean weight increased from 2013 to 2,668 g (5.88 lbs.).

Rainbow trout are a component of the spring and summer fishery. Typically, most rainbow trout harvest occurs in the boat fishery. The average annual harvest for the past ten years has been 3,342. 2014 saw an increase of 116.6% compared to 2013 with a harvest of 6,832 fish. The mean weight decreased to 2,709 g (5.97 lbs.) in 2014, which is 9.1% smaller than the mean weight of rainbow trout harvested in 2013.

Minor species

Some species provide a smaller, yet consistent component of the fishery. The national B.A.S.S. tournament held at Burnham Harbor July 19 - 23, 2000 is evidence that anglers nationwide are aware of opportunities to catch black bass (smallmouth and largemouth bass) in the harbors and shoreline of the Illinois portion of Lake Michigan. Common carp and freshwater drum are targeted both by anglers fishing for food and catch-and-release anglers using European carp tournament fishing techniques. Panfish (other than yellow perch) are targeted or kept incidentally by pedestrian anglers; rock bass harvest has averaged about 2% of the annual yellow perch harvest for the last ten years, representing the largest component of the non-perch panfish fishery. Estimated harvests of rock bass and freshwater drum have generally been similar in scale to estimates of harvest for brown, lake, and rainbow trout for the past 10 years. Approximately 3.3% of total angling effort was directed at minor species in 2014 (i.e., “other” recorded as the species sought during interviews).

Expenditures

Expenditures increased in 2014, while mileage decreased. Major expenditures (i.e., boat, motor and trailers) increased 716.3% and minor expenditures (i.e., tackle, bait, downriggers, etc.) increased 57.2%, despite general declining trends since 2005. Mileage (round-trip, to and from access sites) decreased 8.3%, consistent with a declining trend in angler-trips and total miles estimates for the last decade.

Early spring (March) survey

Fishing effort and success during March is heavily influenced by the weather and the severity of the winter preceding March. For example, March of 2012 was one of the warmest on record for this region, resulting in the highest March angling effort of the last ten years, and above-average harvest of yellow perch, coho salmon, and brown trout. The preceding year (2011) had been cooler, and ice limited angling at Waukegan Harbor, resulting in

reduced effort, and subsequently low yellow perch and brown trout harvests. March 2013 was again relatively cool; of the last ten years of March surveys, 2013 would rank last for total angler effort and harvest of all salmonids, and would rank ninth for yellow perch harvest. March of 2014 was again colder than normal (and followed a very cold winter), but angler effort increased slightly from 2013, and coho salmon harvest was the second-highest in the last ten years (only higher in 2012). Harvest of all other species ranked eighth, ninth, or last among the last ten years' estimates.

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Table 4. Effort (anglers-hours) and harvest (by species) by non-charter anglers in the Illinois portion of Lake Michigan during April-September, 2014. Wau. = Waukegan, Peds = Pedestrian.

		Effort	Harvest							
Type of angler	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	North Point	1,319	153	83	0	0	0	0	0	0
	Wau. Harbor	10,179	614	7,657	50	25	46	14	227	43
	Montrose	96,597	58,103	25,600	37,978	368	369	0	2,153	185
	Belmont	11,199	5,868	4,473	6,183	61	43	0	474	21
	Jackson	12,330	2,441	8,167	953	82	13	27	670	145
	Calumet	4,137	519	2,866	0	50	0	0	381	0
	others	44,710	11,363	27,008	6,567	263	84	77	2,112	413
	TOTALS	180,471	79,061	75,854	51,731	849	555	118	6,017	807
Boat	North Point	72,805	628	70,705	0	99	1,867	1,024	11,593	2,337
	Wau. Harbor	41,362	974	39,382	0	1,091	1,283	904	5,092	1,042
	Diversey	11,272	876	9,491	80	1,142	855	620	831	126
	Calumet	9,207	4,061	3,276	1,333	77	6	0	1,598	9
	others	47,936	4,998	39,599	1,331	2,828	2,266	1,628	5,182	692
	TOTALS	182,582	11,537	162,453	2,744	5,237	6,277	4,176	24,296	4,206
Combined	TOTALS	363,053	90,598	238,307	54,475	6,086	6,832	4,293	30,314	5,012

Table 5. Effort (anglers-hours) and harvest (by species) by non-charter anglers at selected sites along the Illinois portion of Lake Michigan during March, 2014. Wau. = Waukegan, Cal. = Calumet, Peds = Pedestrian.

	Effort	Harvest							
Location	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Wau. Harbor	542	0	542	0	0	0	0	71	0
Wau. Ramp	0	0	0	0	0	0	0	0	0
Montrose	3,414	49	3,364	0	0	0	0	602	0
Cal. Park Peds	1,285	0	1,251	0	0	0	0	315	0
Cal. Park Ramp	1,167	0	1,167	0	73	15	0	381	0
Total	6,408	49	6,324	0	73	15	0	1,369	0

Table 6. Effort and harvest for each month by pedestrian anglers of the Illinois portion of Lake Michigan during April-September, 2014. Wau. = Waukegan.

		Effort	**Harvest**							
Time Period	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
April	North Point	0	0	0	0	0	0	0	0	0
	Wau. Harbor	1,994	0	1,691	0	25	35	0	160	0
	Montrose	14,157	56	13,463	0	242	252	0	1,832	0
	Belmont	2,518	0	2,413	0	21	39	0	426	0
	Jackson	4,002	0	3,784	0	26	13	0	643	0
	Calumet	2,558	0	2,410	0	50	0	0	381	0
	others	12,798	3	11,987	0	96	73	0	1,983	0
May	North Point	127	0	0	0	0	0	0	0	0
	Wau. Harbor	1,331	0	1,241	0	0	0	0	42	0
	Montrose	13,173	6,061	4,619	3,843	27	69	0	291	0
	Belmont	1,598	947	420	631	16	0	0	0	0
	Jackson	501	28	92	0	0	0	0	0	0
	Calumet	336	82	140	0	0	0	0	0	0
	others	3,013	605	1,034	412	7	3	0	30	0
June	North Point	242	0	60	0	0	0	0	0	0
	Wau. Harbor	555	60	86	50	0	0	0	25	0
	Montrose	26,778	25,086	0	18,062	0	0	0	0	0
	Belmont	2,817	2,633	0	3,345	0	0	0	0	0
	Jackson	2,112	1,457	94	355	56	0	0	0	0
	Calumet	313	202	0	0	0	0	0	0	0
	others	8,034	5,984	279	3,020	147	0	0	9	0
July	North Point	427	16	0	0	0	0	0	0	0
	Wau. Harbor	778	427	49	0	0	0	0	0	0
	Montrose	26,717	23,698	134	16,042	0	0	0	0	0
	Belmont	2,098	1,935	0	2,207	0	0	0	0	0
	Jackson	1,319	946	0	599	0	0	0	0	0
	Calumet	373	235	0	0	0	0	0	0	0
	others	5,779	4,448	50	3,133	0	0	0	0	0
August	North Point	388	138	16	0	0	0	0	0	0
	Wau. Harbor	1,458	127	709	0	0	11	0	0	11
	Montrose	7,492	3,203	493	30	78	0	0	0	0
	Belmont	586	353	111	0	0	0	0	0	0
	Jackson	366	9	249	0	0	0	0	0	0
	Calumet	245	0	16	0	0	0	0	0	0
	others	2,068	323	1,036	1	4	4	0	0	4
September	North Point	135	0	6	0	0	0	0	0	0
	Wau. Harbor	4,063	0	3,879	0	0	0	14	0	32
	Montrose	8,280	0	6,892	0	21	48	0	30	185
	Belmont	1,583	0	1,529	0	24	4	0	48	21
	Jackson	4,030	0	3,948	0	0	0	27	27	145
	Calumet	312	0	300	0	0	0	0	0	0
	others	13,018	0	12,623	0	10	4	77	90	409

Table 7. Effort and harvest by anglers using boats of the Illinois portion of Lake Michigan during April-September, 2014. Wau. = Waukegan.

		Effort			**Harvest**					
Time period	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
April	North Point	847	0	151	0	49	0	0	452	0
	Wau. Harbor	4,802	555	3,390	0	286	43	0	789	16
	Diversey	5,590	0	5,152	0	1,108	683	492	831	0
	Calumet	2,458	308	2,109	6	50	6	0	1,598	0
	others	15,451	516	13,669	5	2,405	1,405	995	3,410	6
May	North Point	20,513	260	20,061	0	17	839	125	8,105	578
	Wau. Harbor	9,957	0	9,957	0	697	658	196	3,337	502
	Diversey	1,338	0	870	0	33	33	0	0	67
	Calumet	1,439	216	383	219	8	0	0	0	0
	others	8,073	109	6,623	192	362	339	81	1,375	342
June	North Point	17,636	368	17,080	0	0	587	363	2,076	830
	Wau. Harbor	5,613	304	5,309	0	0	127	43	664	42
	Diversey	1,445	543	902	80	0	0	59	0	59
	Calumet	1,516	1,516	0	326	0	0	0	0	0
	others	6,568	2,256	4,312	447	0	52	137	274	136
July	North Point	13,658	0	13,469	0	33	111	184	768	323
	Wau. Harbor	8,033	115	7,918	0	12	214	421	257	57
	Diversey	803	333	470	0	0	0	0	0	0
	Calumet	1,292	1,087	0	740	0	0	0	0	0
	others	6,069	1,592	4,311	649	5	88	174	106	23
August	North Point	14,388	0	14,388	0	0	200	256	172	533
	Wau. Harbor	6,179	0	6,179	0	96	181	136	0	241
	Diversey	892	0	892	0	0	139	70	0	0
	Calumet	2,152	934	579	42	0	0	0	0	0
	others	6,238	524	5,355	37	39	357	197	0	99
September	North Point	5,762	0	5,556	0	0	131	95	20	74
	Wau. Harbor	6,779	0	6,630	0	0	61	107	46	185
	Diversey	1,204	0	1,204	0	0	0	0	0	0
	Calumet	350	0	206	0	19	0	0	0	9
	others	5,537	0	5,330	0	17	25	44	19	84

Table 8. Yield values of fish harvested by non-charter sport anglers in the Illinois waters of Lake Michigan during April - September 2014. All fish are assumed to be prepared as fillets with 60% waste. Prices for all except brown trout (used lake trout value) are those current in national markets in February, 2015.

Species	Total harvest	Av. wt. (lbs.)	Round wt. (lbs.)	Market wt. (lbs.)	Price per pound	Yield value
Yellow perch	54,475	0.59	32,022	12,809	$16.09	$206,094
Brown trout	6,086	5.88	35,798	14,319	$7.75	$110,973
Rainbow trout	6,832	5.97	40,808	16,323	$12.50	$204,039
Lake trout	4,293	6.28	26,954	10,782	$7.75	$83,557
Coho salmon	30,314	2.53	76,683	30,673	$16.45	$504,574
Chinook salmon	5,012	9.38	47,031	18,813	$25.95	$488,186

Combined yield value of all species: $1,597,424

Table 9. Fin clip abbreviations.

Name of fin or bone	Abbreviation
Adipose fin	ad
Dorsal fin	do
Left maxillary bone	lm
Right maxillary bone	rm
Left pectoral fin	lp
Right pectoral fin	rp
Left ventral fin	lv
Right ventral fin	rv

Table 10. Fin clip summary for salmonids harvested by non-charter anglers in the Illinois waters of Lake Michigan during 2014. Typically, only a portion of the salmonids stocked each year are marked. However, all stocked lake trout are clipped. Lake trout examined by clerks which exhibit no fin clips are one of four possibilities: 1. the lake trout is naturally produced (wild). 2. the lake trout failed to receive a fin clip in the hatchery. 3. the lake trout regenerated the missing fin or fins. 4. the clerk did not examine the lake trout thoroughly enough and missed the clip or clips.

	Species				
Clip	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
ad	2	6	2	1	36
ad, rp	0	1	1	0	0
ad, rv	1	0	0	0	0
do	0	2	0	0	0
do, rv	0	1	0	0	0
lp	0	0	1	0	0
lp, rv	0	1	0	0	0
rp	0	1	6	0	0
rp, lv	0	0	2	0	0
lv	1	1	1	0	0
rv	0	0	8	0	0
no clip	22	63	19	238	49

Table 11. Estimated number of angler trips and expenditures by non-charter anglers in the Illinois portion of Lake Michigan, during 2005 - 2014. In previous years, expenditure estimates were rounded to the nearest $1,000 (or 10,000 miles); 2013 and 2014 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

		Effort	Expenditures		
Type of angler	Year	(angler-trips)	Major (boat)	Minor (gear)	Miles (travel)
Pedestrians	2005	85,449	NA	$574,000	1,530,000
	2006	74,719	NA	$973,000	1,240,000
	2007	75,041	NA	$477,000	1,290,000
	2008	83,841	NA	$1,128,000	1,440,000
	2009	90,555	NA	$900,000	1,650,000
	2010	61,303	NA	$502,000	1,040,000
	2011	40,781	NA	$163,000	730,000
	2012	52,758	NA	$266,000	910,000
	2013	44,709	NA	$300,173	891,196
	2014	45,078	NA	$374,365	888,160
Boats	2005	37,582	$7,386,000	$636,000	1,390,000
	2006	52,277	$12,293,000	$2,116,000	1,740,000
	2007	42,034	$6,914,000	$600,000	1,040,000
	2008	47,636	$2,949,000	$1,469,000	1,360,000
	2009	41,349	$7,584,000	$624,000	1,230,000
	2010	55,701	$12,171,000	$895,000	1,760,000
	2011	37,061	$2,320,000	$532,000	1,230,000
	2012	44,863	$1,668,000	$912,000	1,510,000
	2013	36,575	$750,284	$424,726	1,285,864
	2014	32,471	$6,124,859	$765,368	1,107,217
Season Totals	2005	123,031	$7,386,000	$1,210,000	2,920,000
	2006	126,996	$12,293,000	$3,089,000	2,980,000
	2007	117,075	$6,914,000	$1,077,000	2,330,000
	2008	131,477	$2,949,000	$2,597,000	2,880,000
	2009	131,904	$7,584,000	$1,524,000	2,880,000
	2010	117,004	$12,171,000	$1,397,000	2,800,000
	2011	77,842	$2,320,000	$695,000	1,960,000
	2012	97,621	$1,668,000	$1,178,000	2,420,000
	2013	81,284	$750,284	$724,899	2,177,060
	2014	77,549	$6,124,859	$1,139,733	1,995,377

Table 12. March fishing effort and expenditures by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, during 2005 – 2014. In previous years, expenditure estimates were rounded to the nearest $1,000 (or 1,000 miles); 2013 and 2014 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

		Effort	Expenditures		
Type of angler	Year	(angler-trips)	Major (boat)	Minor (gear)	Miles (travel)
Pedestrians	2005	2,652	NA	$49,000	60,000
	2006	3,378	NA	$38,000	70,000
	2007	2,812	NA	$26,000	50,000
	2008	1,656	NA	$33,000	30,000
	2009	1,750	NA	$42,500	40,000
	2010	2,292	NA	$51,400	51,000
	2011	1,667	NA	$5,300	27,000
	2012	4,517	NA	$47,400	85,000
	2013	611	NA	$3,846	15,081
	2014	1,309	NA	$10,469	25,284
Launched Boats	2005	566	$0	$19,000	13,000
	2006	594	$0	$33,000	12,000
	2007	835	$0	$36,000	8,000
	2008	605	$0	$37,000	9,000
	2009	1,925	$514,000	$61,000	50,000
	2010	2,067	$993,000	$83,000	55,000
	2011	215	$1,599,000	$400	3,000
	2012	1,417	$0	$16,400	31,000
	2013	259	$0	$502	2,145
	2014	207	$276,616	$13,255	2,063
March Totals	2005	3,218	$0	$68,000	76,000
	2006	3,972	$0	$71,000	82,000
	2007	3,647	$0	$62,000	58,000
	2008	2,261	$0	$70,000	37,000
	2009	3,675	$514,000	$103,000	90,000
	2010	4,359	$993,000	$135,000	106,000
	2011	1,882	$1,599,000	$5,700	30,000
	2012	5,934	$0	$63,800	116,000
	2013	870	$0	$4,348	17,226
	2014	1,516	$276,616	$23,724	27,347

Table 13. Fishing effort and harvest by non-charter anglers in the Illinois portion of Lake Michigan, in 2005 - 2014. Estimates were rounded to the nearest whole number. Peds = Pedestrian anglers, Boat = Boat anglers.

		Effort	Harvest					
Angler type	Year	(angler-hours)	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	2005	307,076	275,632	1,294	250	0	2,211	2,459
	2006	276,536	188,535	692	304	0	348	2,734
	2007	251,912	216,437	1,110	311	34	491	2,543
	2008	284,555	144,144	1,854	395	0	2,179	2,313
	2009	325,802	147,941	745	507	0	2,366	2,922
	2010	231,121	93,986	630	384	0	4,712	1,755
	2011	169,723	33,071	664	312	0	4,759	1,155
	2012	207,171	74,406	878	22	12	67	1,464
	2013	172,865	43,314	659	83	0	3,118	1,291
	2014	180,471	51,731	849	555	118	6,017	806
Boat	2005	188,564	27,412	1,095	3,000	1,286	19,035	11,856
	2006	260,217	128,173	2,203	2,651	663	18,286	11,984
	2007	221,692	71,166	638	2,145	849	29,808	8,617
	2008	261,825	173,285	2,594	1,895	1,662	13,799	8,637
	2009	217,193	115,601	854	1,206	689	15,361	3,985
	2010	293,884	107,928	1,973	2,591	958	26,143	6,467
	2011	196,848	23,725	434	2,800	3,008	24,859	4,747
	2012	257,762	19,443	317	4,659	3,624	48,777	12,192
	2013	209,530	9,793	4,356	3,071	2,962	33,121	5,132
	2014	182,582	2,744	5,237	6,277	4,175	24,297	4,206
Season	2005	495,640	303,044	2,389	3,250	1,286	21,246	14,315
	2006	536,753	316,708	2,895	2,955	663	18,634	14,718
	2007	473,604	287,603	1,748	2,456	883	30,299	11,159
	2008	546,380	317,429	4,447	2,289	1,660	15,979	10,950
	2009	542,995	263,542	1,599	1,713	689	17,727	6,907
	2010	525,005	201,914	2,603	2,975	958	30,855	8,222
	2011	366,571	56,796	1,098	3,112	3,008	29,618	5,902
	2012	464,933	93,849	1,195	4,681	3,636	48,844	13,656
	2013	382,395	53,107	5,015	3,154	2,962	36,239	6,423
	2014	363,053	54,475	6,086	6,832	4,293	30,314	5,012

Table 14. March fishing effort and harvest by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, in 2005 - 2014. Estimates were rounded to the nearest whole number. Peds = Pedestrian, Lau'd = Launched boat anglers.

Angler type	Year	Effort (angler-hours)	Harvest Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	2005	11,244	492	762	85	0	173	0
	2006	11,560	0	1,467	65	0	259	0
	2007	9,819	373	764	0	0	386	0
	2008	5,940	261	347	52	0	797	0
	2009	6,296	108	160	85	0	84	0
	2010	8,642	0	549	97	0	65	0
	2011	6,937	28	15	75	0	292	0
	2012	17,941	4,103	915	0	0	1,941	0
	2013	2,363	0	67	0	0	28	0
	2014	5,241	0	0	0	0	988	0
Lau'd	2005	2,830	5,308	346	0	0	111	0
	2006	3,199	4,456	478	0	0	182	0
	2007	4,199	10,165	382	9	0	98	0
	2008	3,117	1,024	81	0	0	0	0
	2009	10,109	19,214	10	0	0	37	0
	2010	10,907	16,928	451	0	206	113	0
	2011	1,144	0	72	0	0	909	0
	2012	8,059	4,780	912	41	21	1,283	0
	2013	1,486	1,135	0	0	0	19	0
	2014	1,167	0	73	15	0	381	0
March Totals	2005	14,074	5,800	1,108	85	0	284	0
	2006	14,759	4,456	1,945	65	0	441	0
	2007	14,018	10,538	1,146	9	0	484	0
	2008	9,057	1,285	428	52	0	797	0
	2009	16,405	19,322	170	85	0	121	0
	2010	19,549	16,928	1,000	97	206	178	0
	2011	8,081	28	87	75	0	1,201	0
	2012	26,000	8,883	1,827	41	21	3,224	0
	2013	3,849	1,135	67	0	0	47	0
	2014	6,408	0	73	15	0	1,369	0

Table 15. Minor species harvest by non-charter anglers in the Illinois portion of Lake Michigan, in 2005 - 2014. Estimates were rounded to the nearest whole number.

Year	Smallmouth bass	Largemouth bass	Rock bass	Bluegill sunfish	Pumpkinseed sunfish	Common carp	Freshwater drum	Round goby
2005	124	18	9,512	848	601	268	3,921	-
2006	46	97	6,697	550	28	147	2,990	-
2007	252	49	10,650	269	20	154	1,965	-
2008	80	45	7,561	405	0	43	2,033	-
2009	76	0	3,934	298	0	240	1,482	-
2010	51	0	1,938	402	9	8	1,768	-
2011	0	4	575	309	0	238	2,946	-
2012	38	0	2,001	406	42	216	3,540	-
2013	68	20	804	546	0	208	6,205	-
2014	154	0	274	0	0	104	688	33,484

Figure 2 (a). Salmonid harvest per unit effort, derived from the Illinois sport fishing surveys of Lake Michigan, 2005-2014

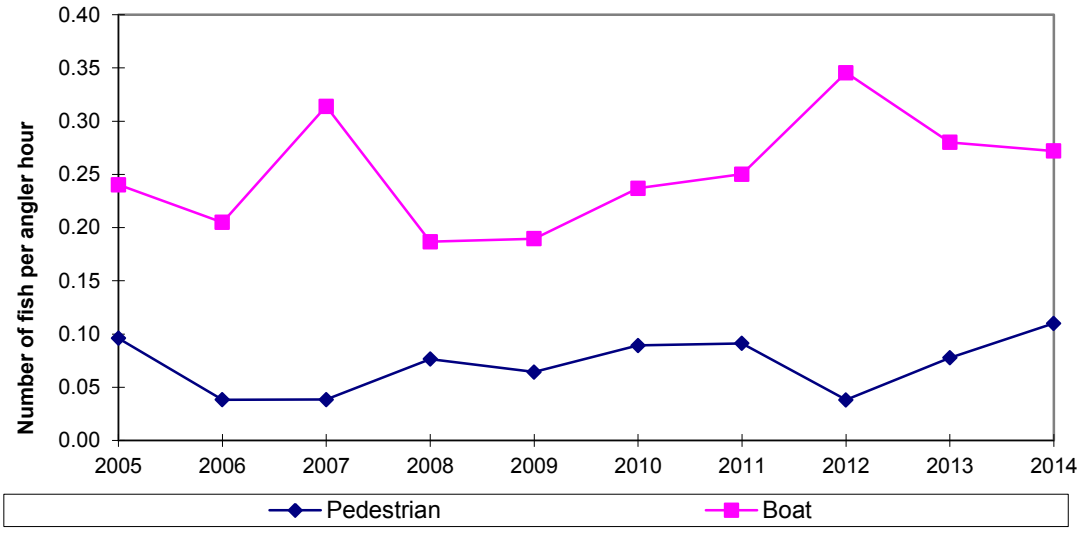


Figure 2 (b). Yellow perch harvest per unit effort, derived from Illinois sport fishing surveys of Lake Michigan, 2005-2014

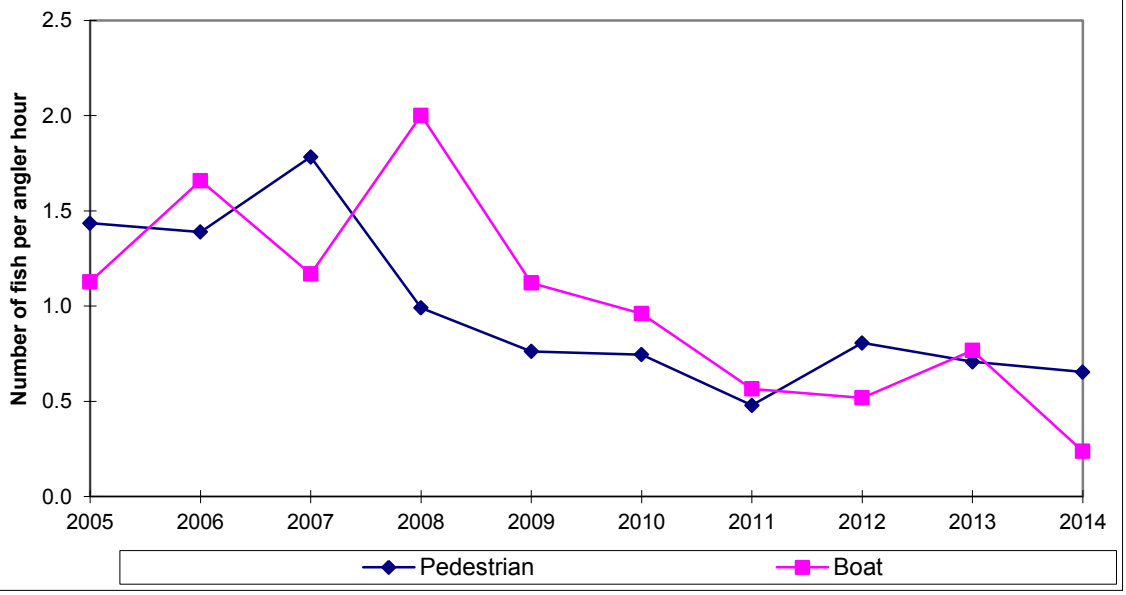


Figure 3 (a). Directed angler effort for salmonids in the Illinois portion of Lake Michigan, 2005-2014

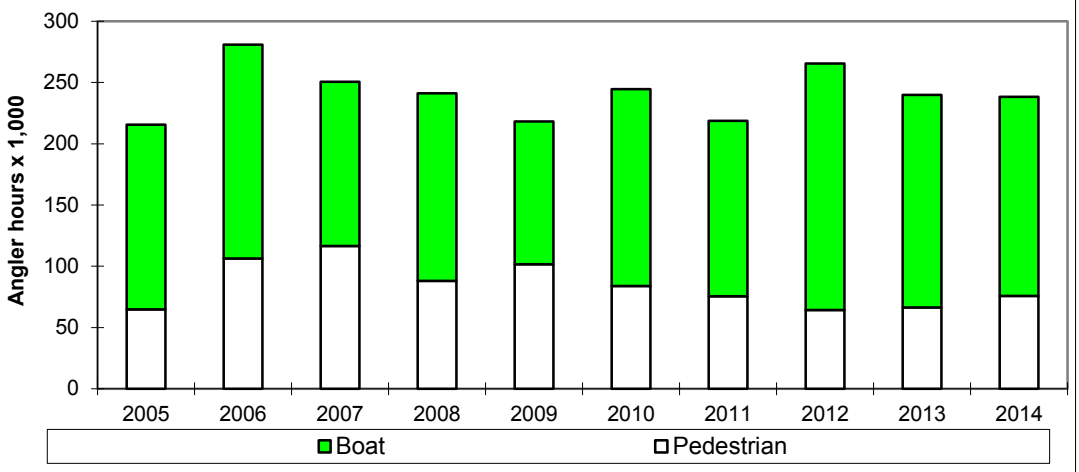


Figure 3 (b). Directed angler effort for yellow perch in the Illinois portion of Lake Michigan, 2005-2014

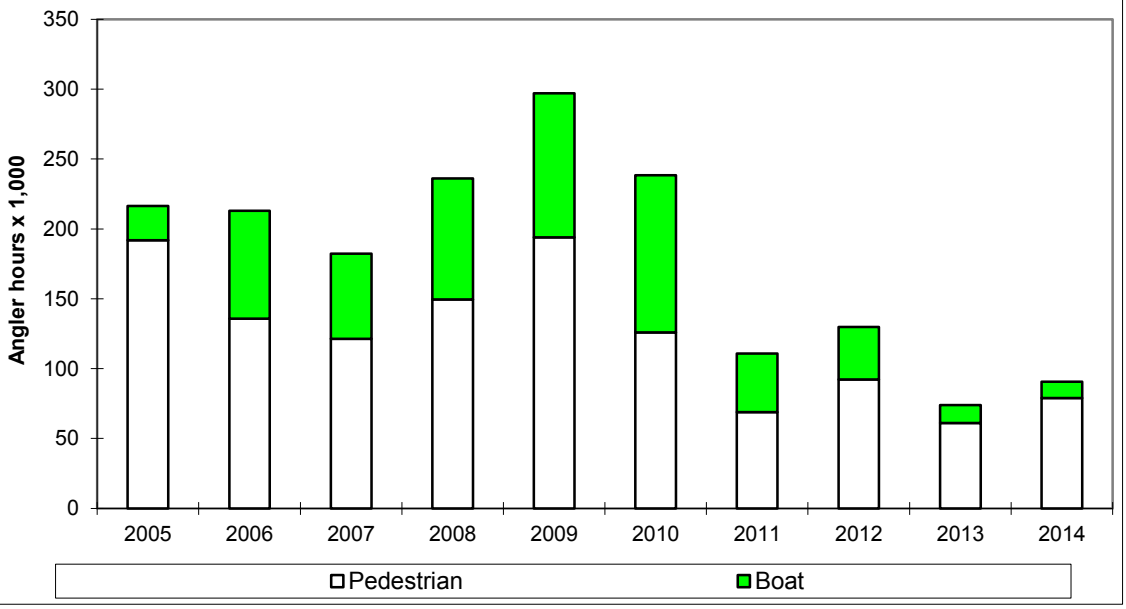


Figure 4. Total yellow perch non-charter sport harvest in the Illinois waters of Lake Michigan, 2005-2014

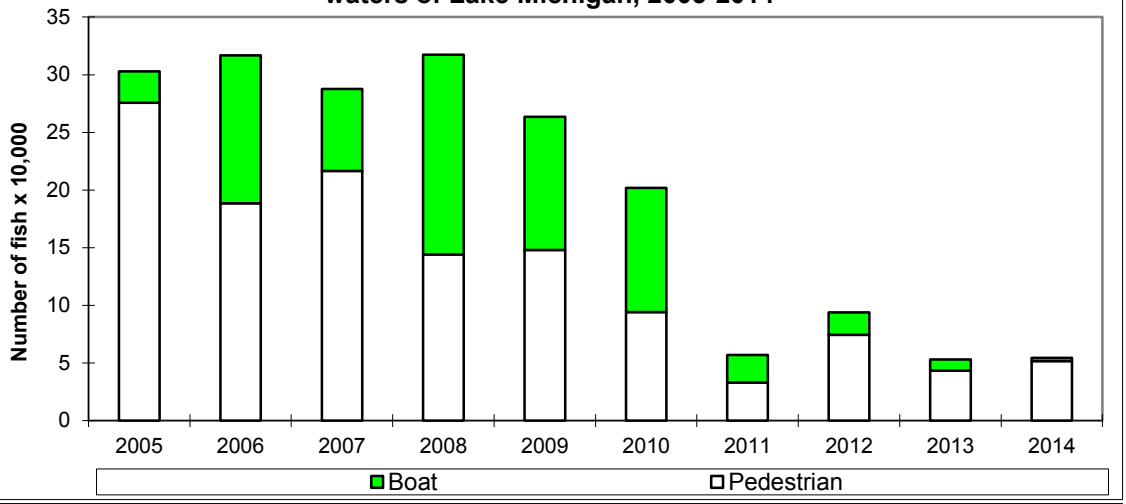


Figure 5. Average lengths of creeled yellow perch from the Illinois waters of Lake Michigan, 1986 - 2014

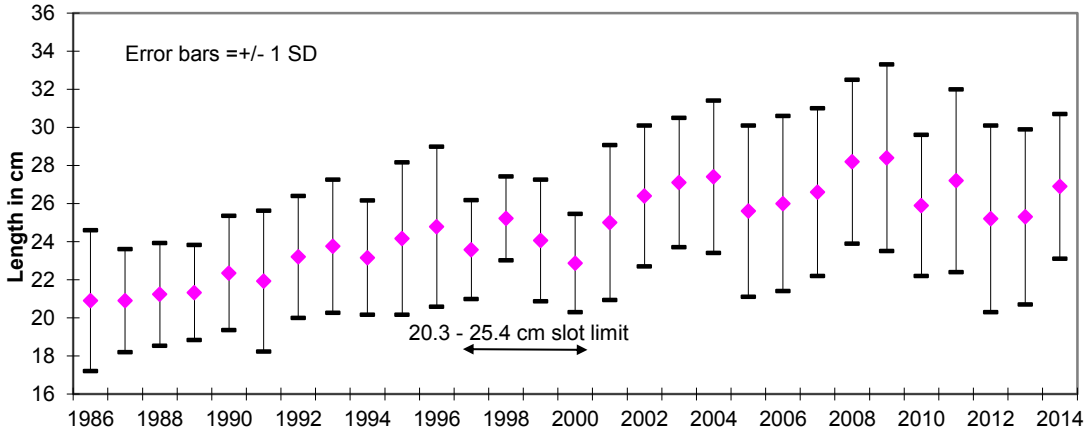


Figure 6. 2014 yellow perch sport harvest from the Illinois waters of Lake Michigan, per month

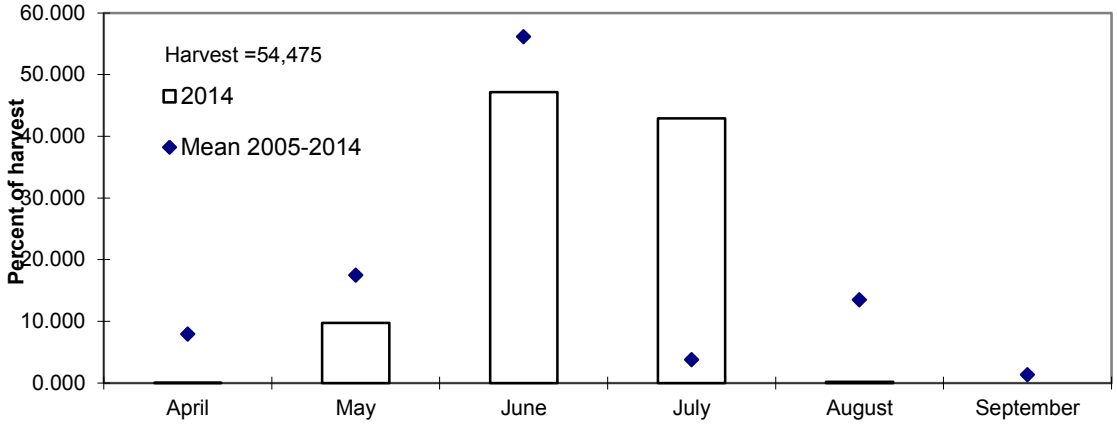


Figure 7. Total non-charter coho salmon sport harvest in the Illinois waters of Lake Michigan, 2005- 2014

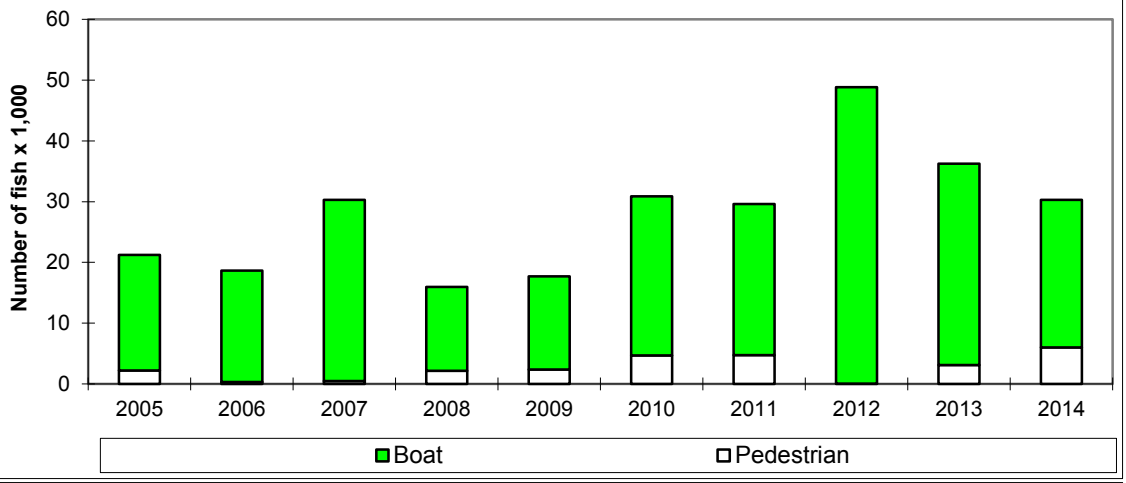


Figure 8. Average lengths of creeled coho salmon from the Illinois waters of Lake Michigan, 1986 - 2014

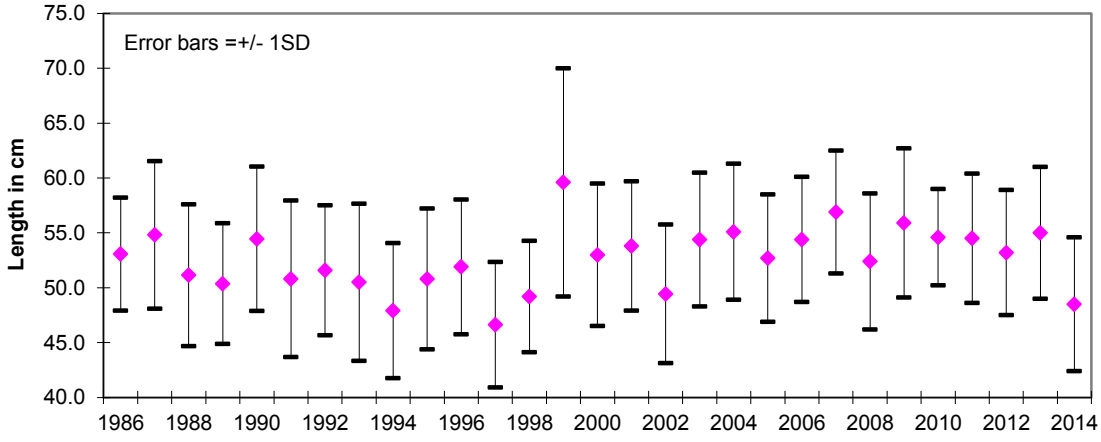


Figure 9. Total non-charter chinook salmon sport harvest in the Illinois waters of Lake Michigan, 2005-2014

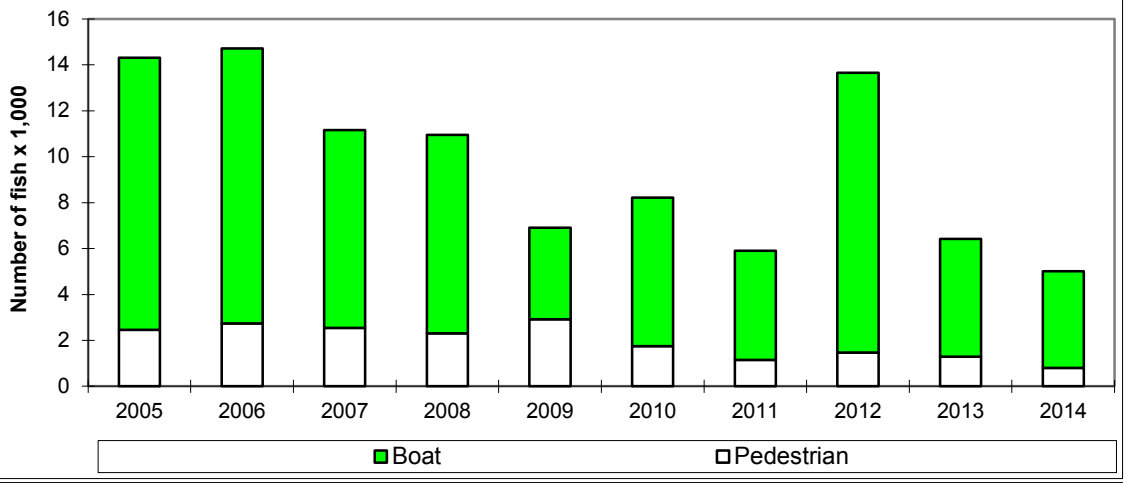


Figure 10. Average lengths of creeled chinook salmon from the Illinois waters of Lake Michigan, 1986 - 2014

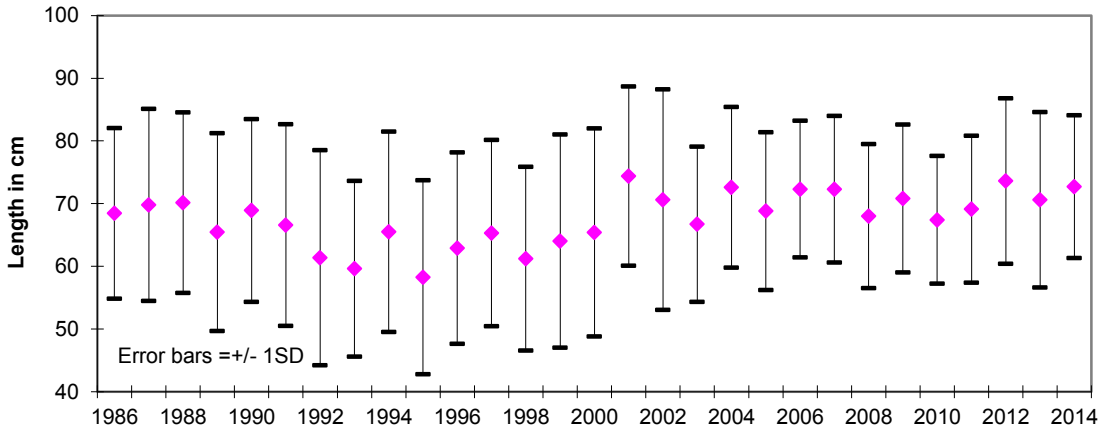


Figure 11 (a). 2014 Salmonid non-charter harvest and effort by pedestrians, per month

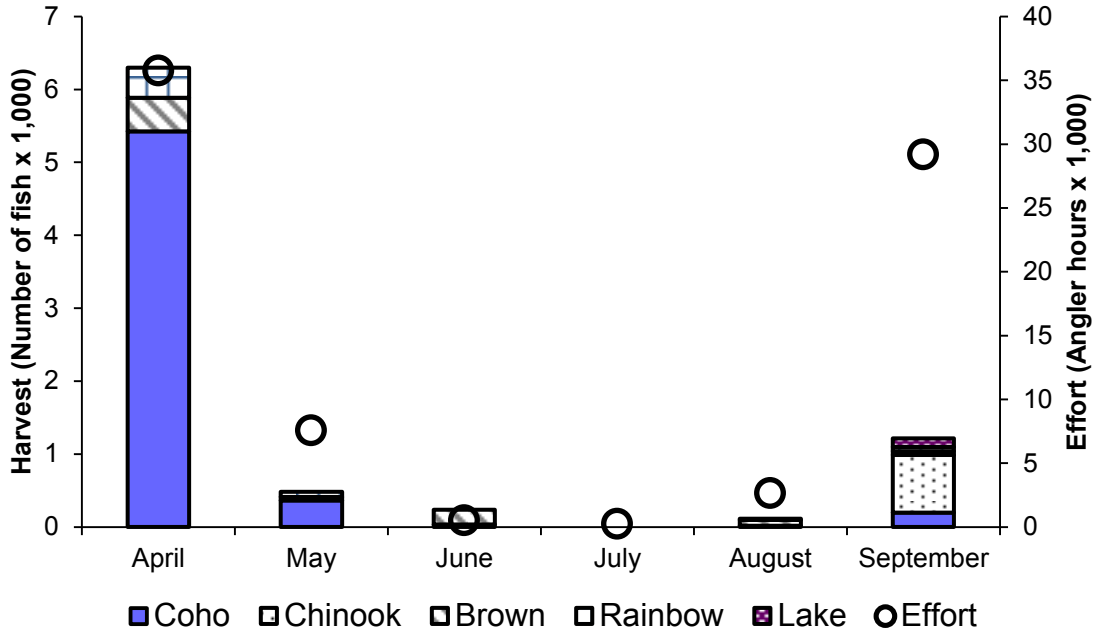
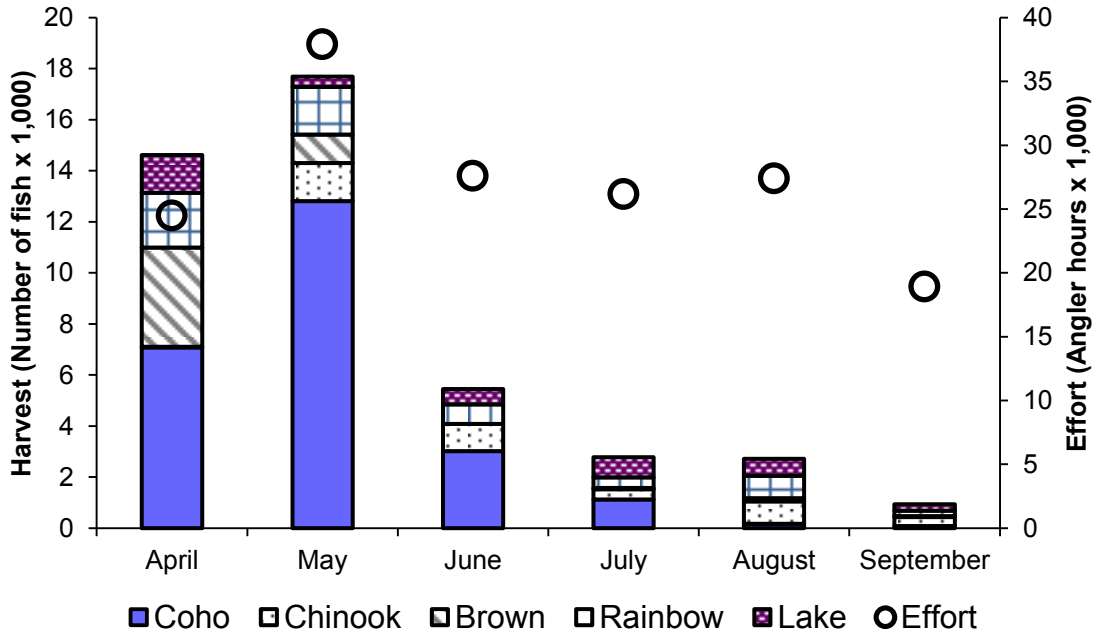


Figure 11 (b). 2014 Salmonid non-charter harvest and effort by boaters, per month



APPENDIX A - COMPARISON OF THE CHARTER AND NON - CHARTER SALMONID BOAT FISHERY

The charter and non - charter boat salmonid fisheries were compared to evaluate whether the two groups target the same salmonid species (Tables A1 and A2). In general, composition of total harvest for both groups has been similar for the last ten years. Harvest-per-unit-effort (HPE) for both groups is presented in Figure A1; the charter fishery has generally exhibited higher success than the non - charter boat fishery (charter HPE approximately double non-charter HPE). The combined harvest of both charter and non - charter anglers (boats and pedestrians) for 2005 - 2014 is presented in Figure A2. These data represent only harvest and effort from April-September (early spring surveys are not included).

Table A1. Non-charter boat harvest composition (boats only) April – September 2005 - 2014.

	Effort	Percent of total harvest					
Year	(angler-hours)	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon	Total salmonids
2005	151,010	3.0	8.3	3.5	52.5	32.7	36,272
2006	174,621	6.2	7.4	1.9	51.1	33.5	35,787
2007	133,974	1.5	5.1	2.0	70.9	20.5	42,057
2008	153,169	9.1	6.6	5.8	48.3	30.2	28,587
2009	116,514	3.9	5.5	3.1	69.5	18.0	22,095
2010	160,945	5.2	6.8	2.5	68.6	17.0	38,132
2011	143,331	1.2	7.8	8.4	69.3	13.2	35,848
2012	201,326	0.5	6.7	5.2	70.1	17.5	69,569
2013	173,695	9.0	6.3	6.1	68.1	10.6	48,642
2014	162,453	11.9	14.2	9.4	55.0	9.5	44,192

Table A2. Charter boat harvest composition April – September 2005 - 2014.

	Effort						Percent of total harvest
Year	(angler-hours)	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon	Total salmonids
2005	114,599	2.4	8.6	4.0	51.2	33.7	58,473
2006	99,698	1.2	5.5	2.5	54.0	36.7	51,753
2007	87,763	2.9	3.2	2.9	66.5	24.6	50,218
2008	91,756	2.9	5.2	4.6	59.4	28.0	41,499
2009	88,221	2.0	6.7	5.3	59.1	26.9	34,349
2010	94,406	1.1	13.9	6.0	53.1	26.0	43,883
2011	91,235	0.5	8.6	7.0	67.6	16.3	48,585
2012	96,818	1.0	6.0	10.8	58.1	24.2	50,425
2013	95,530	2.2	7.1	12.2	63.8	14.6	42,556
2014	94,976	1.2	10.0	19.2	60.2	9.4	40,902

Figure A1. Comparsion of charter and non-charter boat salmonid harvest rates for the Illinois portion of Lake Michigan, 2005-2014

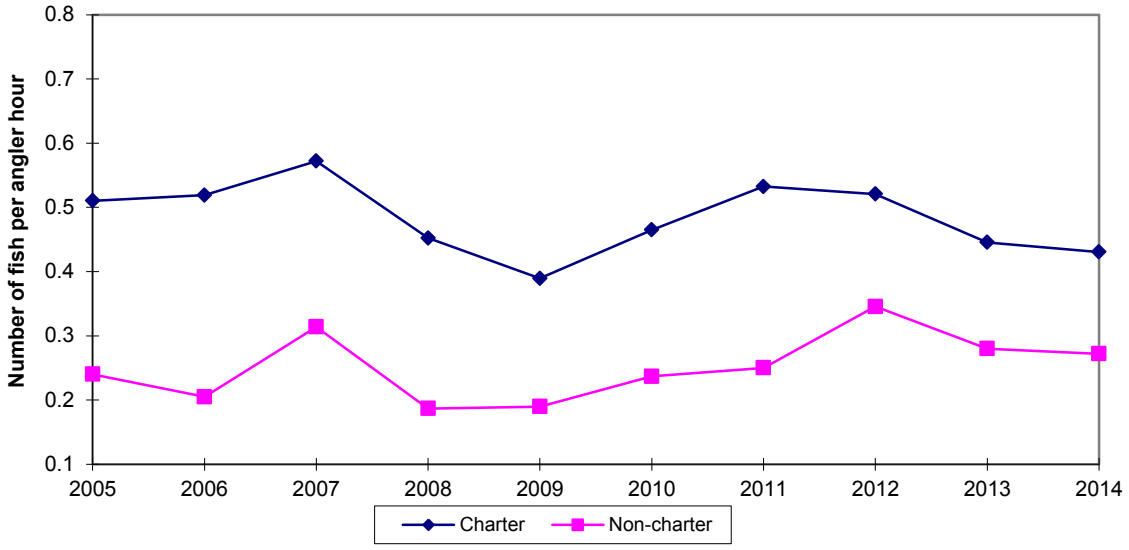


Figure A2. Illinois Lake Michigan sportfishing harvest (charter & regular combined) 2005 - 2014